Enhancing Incentives for Knowledge Generation and Diffusion to Address the Problems of the Poor:

Innovative Financing Options

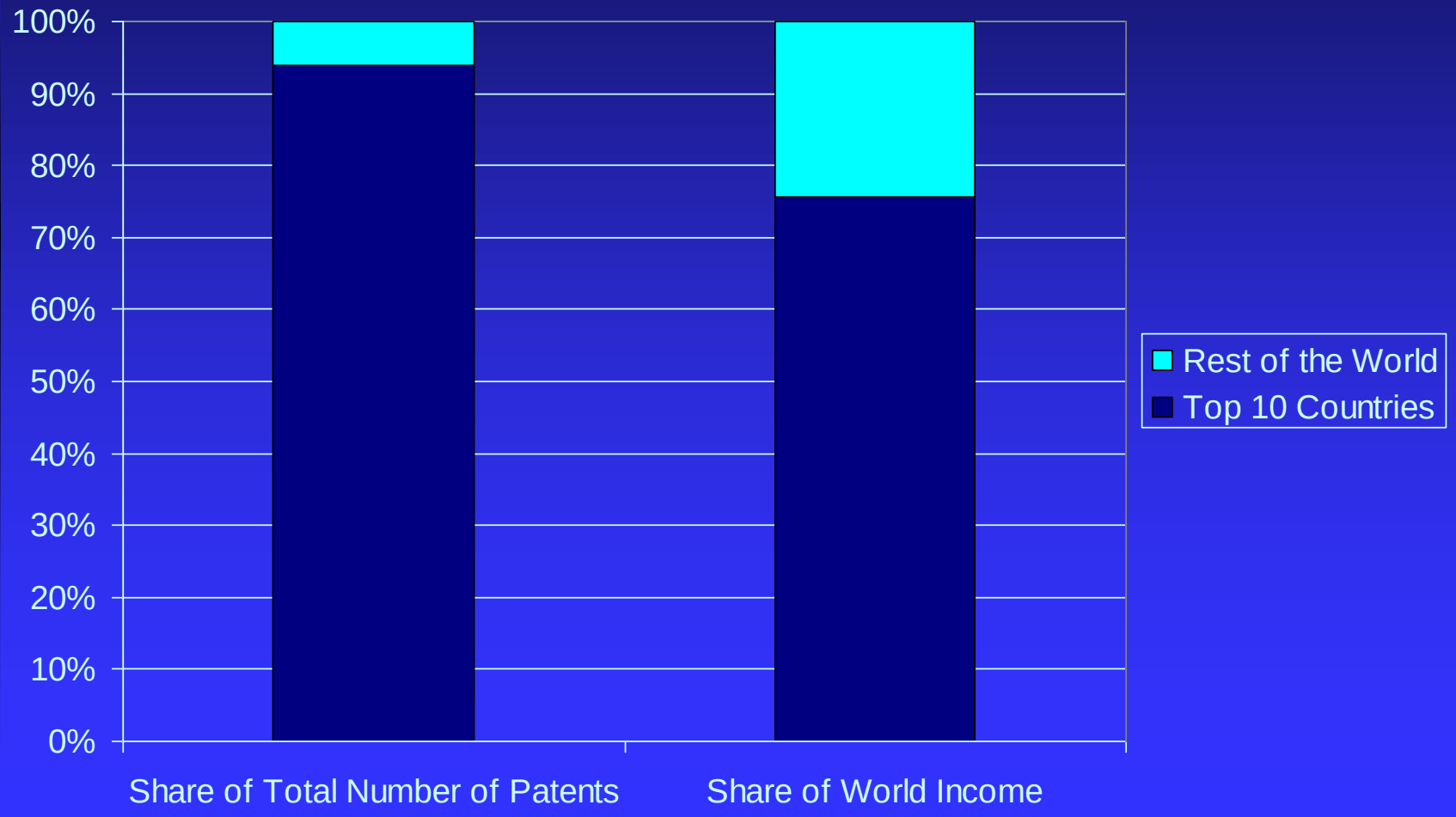
Pedro Conceição

Steps

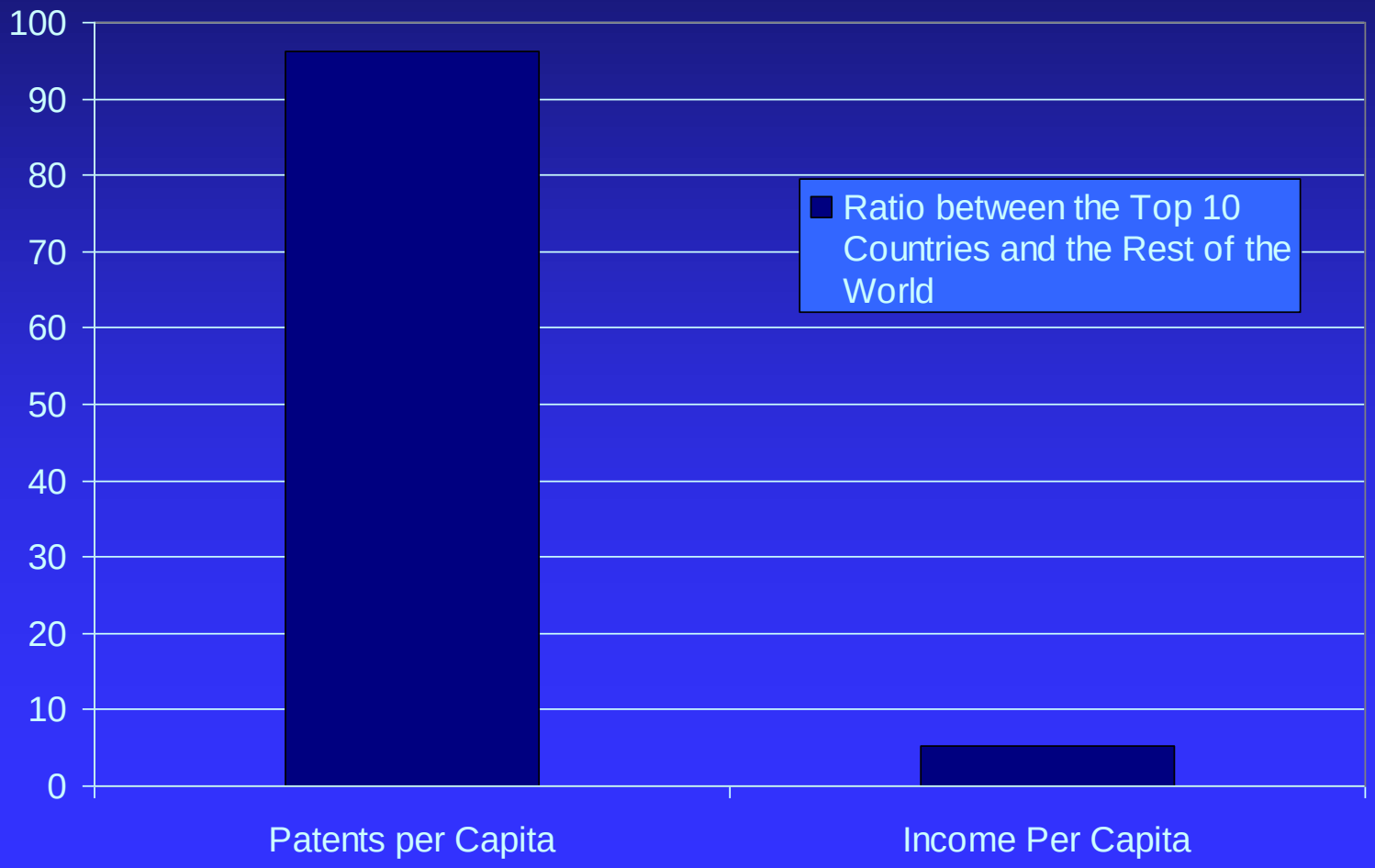
1. Context: The Global Knowledge Divide
2. The Case of Health
3. Innovative Financing Options
4. Discussion: What is needed and what is feasible?

1. The Global Knowledge Divide

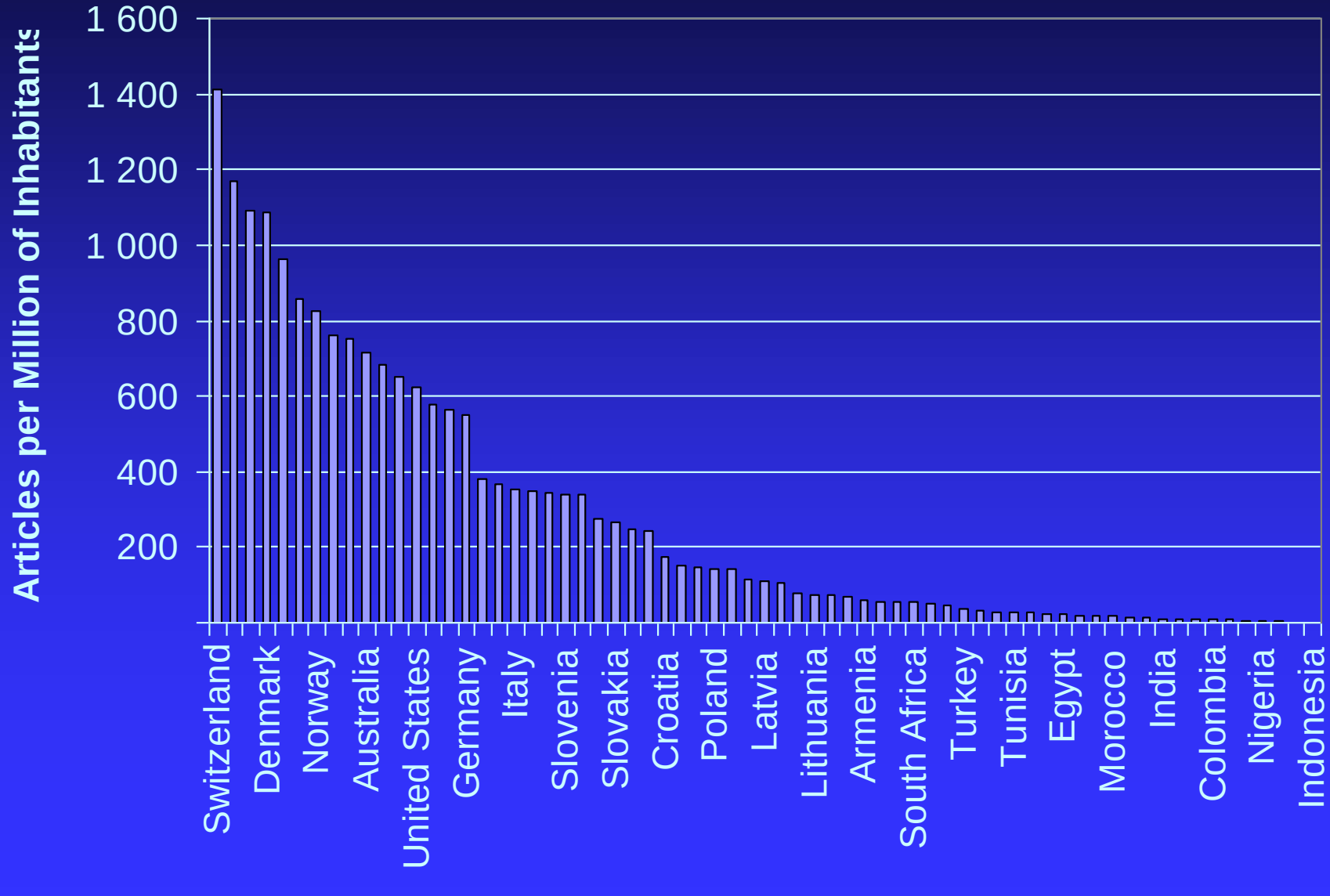
Evidence on the Knowledge Divide I: Share of World Patents and Income



Evidence on the Knowledge Divide II: Patents and Income per Capita



Evidence on the Knowledge Divide III: Scientific Production



The Sachs' View of the World

- Group 1: The Innovators
  - 1 billion people (most OECD)
  - Described by endogenous growth models
- Group 2: The Diffusers
  - 3.5 billion people (China, India, Southern Cone of South America, Eastern European EU members)
  - Absorb technology by i) buying capital goods, ii) FDI, iii) final consumption of consumer goods
- Group 3: The (Income and Knowledge) Poor
  - 1.5 billion people (Sub-saharan Africa, Andean region, Central and South Asia)
  - Almost absolutely excluded

Why is there a Knowledge Divide? I

- Knowledge production requires a mix of public and private incentives for knowledge generation
  - Public support
  - IPRs
- The mix is important because there is a need to balance between dynamic efficiency and static efficiency
- Both private and public actors play roles as suppliers and consumers of science, technology and innovation in national and regional systems of innovation

Why is there a Knowledge Divide? II

- Current Incentives and Capacity are Insufficient to Produce Knowledge Required by the Poor
  - Limited effectiveness of private incentives (small and “thin” markets)
  - Limited resources devoted, in a sustained way, by the poor to research and to technological innovation (failure of public incentives)
  - Limited contribution of other countries’ research to address problems specific to the poor
  - Limited access by the poor to knowledge produced in developed countries
- The result: a highly skewed supply and diffusion of innovations that leaves the poor out

What has the Response Been Like?

- Since there is no “global government,” little public support to global issues and virtually none to support the development of knowledge relevant exclusively to the poor
- The *global* response so far has been mostly centered on private incentives to enhance dynamic efficiency (e.g. extending intellectual property rights through TRIPS)

What has been the rationale?

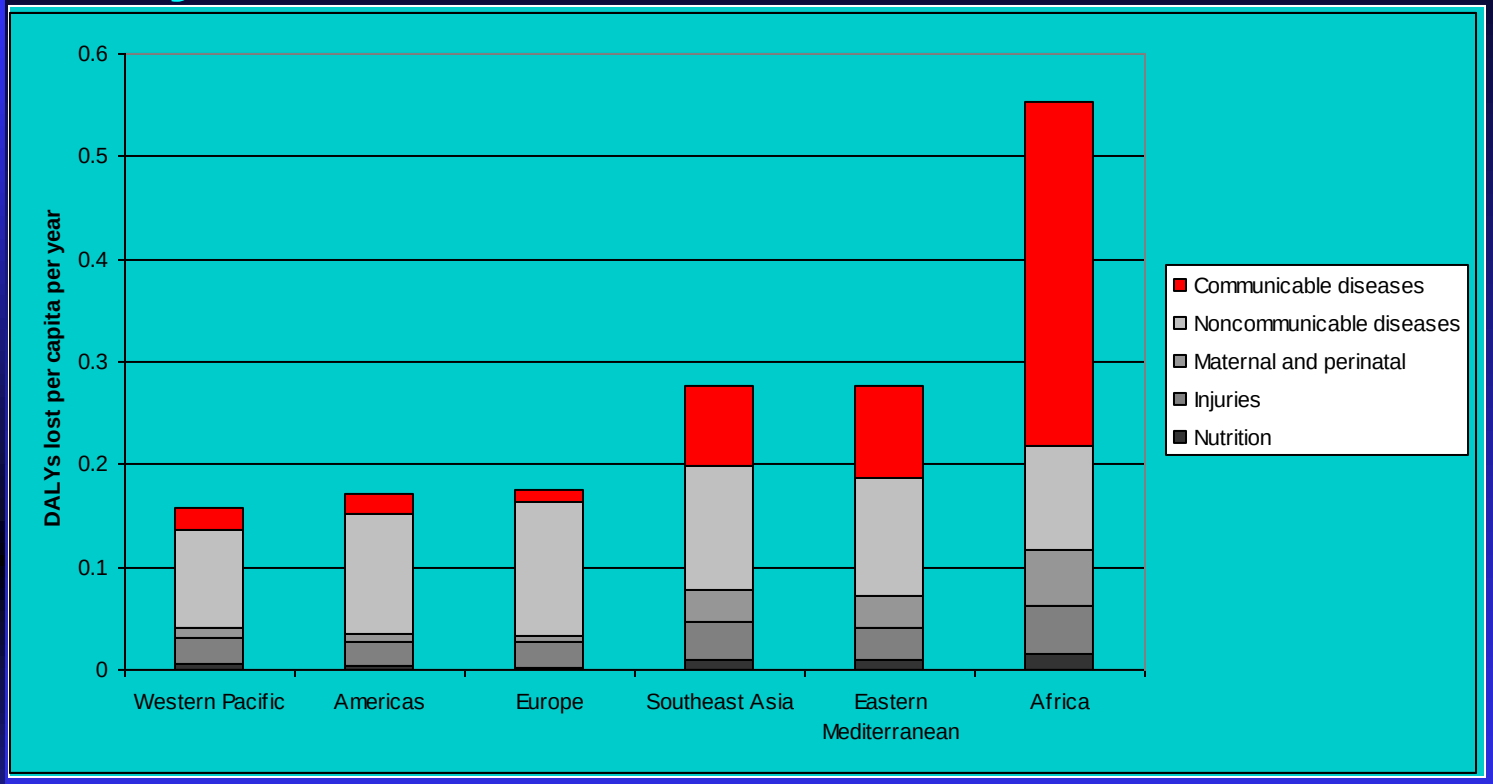
- The rehtoric and some of the practice of swinging the pendulum from public support to private incentives
- The national interests of rich countries in trade negotiations (the political economy of international IPRs)
- The argument that the science and technology are “luxuries” and that the poor have more pressing issues to deal with

What is Wrong with the Current Response?

- Inconsistent with national practice in most developed countries, and especially the US, which have devoted over long periods of time substantial public resources to R&D
- Lack of theoretical and empirical support to the assertion that international IP harmonization is the best response to avoiding free-riding and promoting local innovation
- Science, technology and innovation have proved key in solving both larger and smaller development challenges:
  - Green Revolution
  - Ochocersiasis Control
  - Drancunculiasis Control (close to eradication)

2. The Case of Health

Why Health? I



- Malaria: more than 1 million deaths
- TB: close to 2 million deaths
- HIV/AIDS: more than 3 million deaths
- 1.4 million deaths per year in poor countries from childhood diseases readily combated by immunization, compared with fewer than 1,000 in developed countries

Why Health? II

- Malaria: cuts output in sub-Saharan Africa by 17%
- TB: costs about 20% of household income and cuts output in sub-Saharan Africa by 4%-7%
- HIV/AIDS: cuts output in sub-Saharan Africa by 35%
- Each less ten years of life expectancy costs (after controlling for other factors) 0.3 to 0.4 % a year in terms of economic growth:

  Comparing the average life expectancy of a rich with that of a poor country (77 years vs. 49 years) the gap in the yearly growth rate is of 1.6% (CMH 2001: 24)

Why Health? III

- Success is possible:
  - Smallpox eradication ($168 billion in benefits from 1978 to 1998, and counting)
  - Polio almost eradicated (savings of $1.5 billion a year)
- Science, technology and innovation do matter:
  - One of the most R&D intensive sectors, where incentives for knowledge generation and diffusion are key
  - Knowledge on health conditions has been responsible for major improvements in well-being over the 20th century

Why Health? IV

- Gross asymetries in knowledge generation:
  - $70 billion a year on health R&D by the public and private sectors, but only 10% is used for research into 90% of the world's problems (“10/90 gap”)
  - of 1 393 new chemical entities marketed between 1975 and 1999, only 16 were for tropical diseases and tuberculosis. There is a 13-fold greater chance of a drug being brought to market for central-nervous-system disorders or cancer than for a neglected disease.
- Highly contentious issue of access by the poor to IP protected drugs
- Deeply suspicious pharmaceutical sector to producing drugs and vaccines for the poor

The Issues

	Knowledge Applicable Only In Poor Countries	Knowledge Applicable Both In Poor And Other Countries
Knowledge Exists	• Malaria control	• Childhood vaccines • ARVs
Knowledge Does not Exist	• Malaria vaccine • TB vaccine (effective) • HIV/AIDS vaccine (?)	• Cancer treatment • HIV/AIDS vaccine (?)

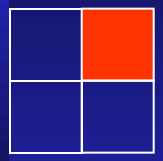
The Challenges

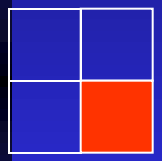
	Knowledge Applicable Only In Poor Countries	Knowledge Applicable Both In Poor And Other Countries
Knowledge Exists	• "Demand" challenges	• IP-driven prices • "Demand" challenges
Knowledge Does not Exist	• No incentives • No capacity	• Scientific and Technical • IP-driven prices • "Demand" challenges

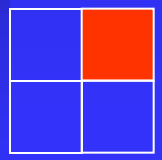
3. Innovative Financing Options

Knowledge Relevant for Both

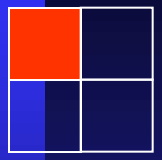
- IP-Priced Challenges: Thrust of Options is Segmentation and Differentiation
  - Knowledge Exists: differential pricing, which enhances static efficiency without detracting, in the leastest, dynamic efficiency
  - Knowledge does not Exist: differential patenting (Lanjouw proposal), allowing for IP protection for either the poor or the other countries, not both, through a foreign filing license
  - Problems:
    - Ensuring segmentation
    - Political acceptance of segmentation by those not poor
- Demand Challenges: Create Reliable and Stable Demand
  - GAVI, Global Fund to Fight AIDS, TB and Malaria
  - “Clinton deal”



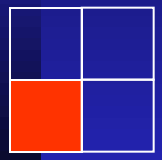




Knowledge Relevant for the Poor Only



- Knowledge Exists, then mostly Demand Challenges: Reliable and Stable Demand
  - GAVI, Global Fund to Fight AIDS, TB and Malaria
  - Global TB Drug Facility



- Knowledge does not Exist:
  - Prizes
    - Research contests
    - Patent buyouts
    - Purchase commitments
  - Tax credits
    - on R&D directed to the conditions of the poor
    - on sales of pharmaceuticals for the poor
  - Extending “Orphan Drug Legislation”
    - Patent extensions on existing pharmaceuticals
  - Direct funding to R&D

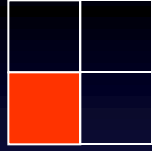
Prizes

- General Characteristics:
  - Sponsor pays an award to the innovator
  - Sponsor only has to pay if there is innovation
  - Sponsor defines how the innovation is used
  - E.g.: sterilization, canned food, measurement of longitude, aviation, science
- Variants:
  - Sponsor specifies objective (e.g. X prize);
  - Sponsor organizes research contest (e.g. US DOD);
  - Patent buy-outs (sponsor pays ex-post);
- Purchase commitments for vaccines of the poor (Kremer):
  - Encourages innovation *and* diffusion

Tax Credits

- On R&D:
  - Pharmaceutical companies can get credits for R&D on conditions of the poor;
  - Difficult to monitor, no guarantee of innovation;
- On Sales:
  - Pharmaceutical companies can get credits for sales of pharmaceutical products to the poor
  - Stronger innovation incentive;
  - Also an incentive for diffusion;
- Examples include the Kerry-Frist proposal in the US Senate and the Gordon Brown suggestion

Orphan Drug Legislation



- It exists nationally: “Orphan diseases” in the US, EU and Japan get special incentives:
  - In the US, up to 7 years of market exclusivity;
  - Grants for R&D and clinical trials;
  - Accelerated review in clinical trials;
  - Special tax treatment of sales;
- Patent or Market Exclusivity Roaming:
  - Patent extensions on existing pharmaceuticals;
  - Market exclusivity;
  - Exists for pediatric pharmaceuticals in the US;
- Extend “orphan status” to the international level, and consider especially the possibility of patent or exclusivity roaming

Direct Funding to R&D

- Mostly through Public/Private Partnerships:
  - Medicines for Malaria Venture;
  - Global Alliance for TB Drug Development;
  - International AIDS Vaccine Initiative (IAVI);
  - Drugs for Neglected Diseases Initiative (DNDi);
- Gates Foundation “Grand Challenges on Global Health”
- Proposals to create a Global Health R&D Fund
- Proposals to create a Manhattan Project for the development of a HIV/AIDS vaccine

4. Discussion: What is Needed and What is Feasible?

Points to reflect upon

- What can be generalized beyond health? E.g., agricultural R&D, where prizes have also been proposed? Other?
- Is there one “silver bullet”? Would many proposals entail dispersion and waist? What criteria would tell us what the best options are?
- Or should we invest in enriching the institutional ecology of incentives with many different initiatives?
- Isn’t the linear model of innovation behind much of reasoning providing rationales for the specific financing options?
- What steps to take in order to consider a “global system of innovation” that does not leave the poor out?
- How far should we extend our imagination in designing new incentives and institutions (e.g. open source/access models; international R&D treaties; liability rules).
- Are we forgetting science?